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Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

LISTING OF CLAIMS

1. (Original) A system for rapidly generating pilot training schedules for all pilots of an entire airline, which comprises:

user communication means for receiving user requests for said pilot training schedules and input data from a user;

optimization processor means in electrical communication with said user communication means for receiving said user requests and said input data, and in response to said user requests generating optimal pilot training schedules rapidly for all pilots of said entire airline from said input data, wherein said optimization processor generates a mixed integer programming model of an optimizer session as follows in response to said daily training schedule, and solves said mixed integer programming model to provide detailed optimal pilot training schedules;

<<Start underline>>

$$\sum_{i\in I,\, j\in J} C_{ij} x_{ij} + \sum_{i\in L,\, m\in M,\, n\in N} C_{imn} y_{imn} \cdot$$

<<End underline>>

wherein said mixed integer programming model includes the following constraints:

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(i) $\sum_{j \in E(i)} x_{ij} = 1$, where $\forall i \mid i$ corresponds to a class assignment;

(ii) $\sum_{j \in E(i)} x_{ij} \leq 1$, where $\forall i \mid i$ corresponds to a recurrent training assignment;

(iii) $\sum_{i \in E(j)} x_{ij} \leq 1$, where $\forall j$;

(iv) $\sum_{j \in P_1(i,k)} x_{ij} - \sum_{j \in P_2(i,k)} x_{ij} \leq 0$, where $\forall i,k \mid$ CGD i needs a DPD on the following day; and

(v) $\sum_{l \in r} \sum_{j \in E(i)} x_{ij} \leq D_{lm} + EG_{lm} \sum_{n \in N} W_n * y_{lmn}$, where $\forall l,m$.

<<End underline>>; and

data storage means in electrical communication with said optimization processor means for storing said input data, said user requests, and said optimal pilot training schedules for access by said user, wherein

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$j \in E(i)$ is the set of Device Period Days (DPD) j that can be assigned to Class Group Days (CGD) i;

$i \in E(j)$ is the set of CDG i that DPD j can serve;

$j \in P_1(i,k)$ is the DPD j that can be assigned to CGD i in device period k;

$j \in P_2(i,k)$ is the set of DPD j that can be assigned to the same class group represented by CGDi on the following training day if the two days are scheduled on consecutive calendar days and CDGi is assigned in the device period k;

C_{ij} is the cost of assignment of CGD i to DPD j;

C_{lmn} is the balancing of cost of level n for training type l in month m;

W_n is the threshold weight of level n;

D_{lm} is the number of student groups who are due recurrent training of type l in month m;

EG_{lm} is the number of student groups who are due recurrent training of type *l* in month *m*-1 but can be trained late plus the number of pilots who are due recurrent training of type *l* in month *m*+1 but can be trained early;

x_{ij} is 1 if DPD *j* is assigned to CGD *i* and 0 otherwise; and

y_{lmn} is 1 if threshold is reached and 0 otherwise.

<<End underline>>

2. (Original) The system of Claim 1, wherein said input data includes identification of available training resources, available training instructors, classes that need to be scheduled, a class roster for each class to be scheduled, individual student training requirements, recurrent training requirements, individual student experience and qualifications, and training curriculum information.

3. (Original) The system of Claim 2, wherein said optimization processor means executes a branch and bound algorithm to generate a daily training schedule for each of said classes by determining on which calendar days training will take place.

4. (Canceled)

5. (Canceled)

6. (Original) The system of Claim 3, wherein said branch and bound algorithm generates plural branch and bound trees which are used in repeated cycles with each tree solving a larger subset of said classes to progressively refine said daily training schedule until all of said classes have been scheduled.

7. (Original) The system of Claim 6, wherein each of said plural branch and bound trees is comprised of a root node, child nodes, and leaf nodes, and said optimization processor means compares said leaf nodes of each of said plural branch and bound trees to select said optimal training schedules.

8. (Original) The system of Claim 1, wherein said optimal pilot training schedules include detailed assignment of resources for each day of training for each student in each class.

9. (Canceled)

10. (Original) The system of Claim 3, wherein said branch and bound algorithm generates plural branch and bound trees which are used in repeated cycles with each tree solving a

larger subset of said classes to progressively refine said daily training schedule until allotted time for generating said daily training schedule has elapsed.

11. (Canceled)

12. (Canceled)

13. (Canceled)

14. (Canceled)